

## Course Outline

**Code: ENG104**

### Title: Introduction to Engineering Design

**School:** Science & Engineering  
**Teaching Session:** Semester 2  
**Year:** 2020  
**Course Coordinator:** Dr Ayodele Olofinjana  
**Course Moderator:** Associate Professor Selvan Pather

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

#### 1. What is this course about?

##### 1.1 Description

Engineering design is the practice of turning “dreams” into reality. It involves conceptualising and interpreting ideas and providing a feasible solution. This course introduces you to the whole systems design cycle approach in which you apply basic design concepts, analyse human-centric needs and solve problems to meet these needs. You will also learn how to communicate engineering designs using CAD. Using a design brief from a real-life challenge, you will work together in a group to come up with well-reasoned feasible solution to the identified problems.

##### 1.2 Field trips, WIL placements or activities required by professional accreditation

Activity	Details
Nil	Nil

#### 2. What level is this course?

100 level Introductory - Discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Normally associated with the first full-time year of an undergraduate program.

#### 3. What is the unit value of this course?

12 units

#### 4. How does this course contribute to my learning?

Specific Learning Outcomes	Assessment tasks	Graduate Qualities or Professional Standards mapping
On successful completion of this course, you should be able to:	You will be assessed on the learning outcomes in task/s:	Completing these tasks successfully will contribute to:
Solve human-centric engineering problems to improve life by taking and applying a <i>whole systems design cycle approach</i>	2 and 3	Sustainability- focussed

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<b>Specific Learning Outcomes</b> On successful completion of this course, you should be able to:	<b>Assessment tasks</b> You will be assessed on the learning outcomes in task/s:	<b>Graduate Qualities or Professional Standards mapping</b> Completing these tasks successfully will contribute to:
Respond to a regional or international engineering brief and create and justify a conceptual design, considering human context, potential outcomes, constraints and risks.	3	Engaged
Demonstrate basic skills in engineering drawing methods and techniques	1	Empowered
Interpret, analyse and evaluate engineering design alternatives.	2	Empowered
Communicate design solutions using engineering drawings, written reports and a presentation to specialist audiences.	1, 2 and 3	Engaged
Act professionally by: <ul style="list-style-type: none"> <li>• functioning autonomously and in teams</li> <li>• adhering to the engineering code of ethics and sustainability practices</li> </ul>	3	Ethical

### 5. Am I eligible to enrol in this course?

Refer to the [USC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

#### 5.1 Enrolment restrictions

This course is only available to students enrolled in SC410, SC411, SC425, SC404, SC405 (SC367 and Prosthetics and Orthotics Extended Major), AB101, UU301 or XU301

#### 5.2 Pre-requisites

Nil

#### 5.3 Co-requisites

Nil

#### 5.4 Anti-requisites

ENG202

#### 5.5 Specific assumed prior knowledge and skills (where applicable)

Not applicable

### 6. How am I going to be assessed?

#### 6.1 Grading scale

Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

#### 6.2 Details of early feedback on progress

In Week 3 a draft copy of your task 1 (engineering drawing) will be reviewed by your tutor and a feedback will be provided.

### 6.3 Assessment tasks

Task No.	Assessment Product	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1	Portfolio	Individual	25%	(i) Multi views (ii) Isometric drawing	Friday Week 6	Online Assignment Submission
2	Written Piece	Individual	25%	1500 words	Friday Week 8	Online Assignment Submission with Plagiarism check
3	Report	Group	50%	Final report- 2000 words per student.  10 minutes, 5 slides, 200 words equivalent including diagrams	Draft report Monday Week 10 Oral presentation Week 12  Final report Friday Week 13	Online Assignment Submission with Plagiarism check
			100%			

#### Assessment 1: Engineering Drawing

<b>Goal:</b>	You will develop skills for drafting to communicate design using specialised software
<b>Product:</b>	Portfolio
<b>Format:</b>	You individually produce CAD and freehand drawings based on pictorial views of engineering components related to design problems. CAD drawings include orthographic projections, auxiliary views and isometric drawings.  Week 3 - Formative feedback given on multi-view projections to assist in Task 1 submission.
<b>Criteria:</b>	<ol style="list-style-type: none"> <li>1. Application of software</li> <li>2. Evidence of Engineering design principals</li> <li>3. Relevance to given problem</li> <li>4. Accuracy of multi –views application</li> <li>5. Engineering standards</li> </ol>
<b>Engineers Australia competencies assessed in this task</b>	
1.2 Conceptual understanding of mathematics, numerical analysis, statistics, and <u>computer and information sciences</u> which underpin the engineering discipline. 2.1 Application of established engineering methods to complex engineering problem solving. 3.2 Effective oral and written communication in professional and lay domains	

**Assessment Task 2: Product design analysis and redesign**

<b>Goal:</b>	You will apply your understanding of the process of product redesign for continuous improvement and communicate it to a specific audience.
<b>Product:</b>	Written Piece
<b>Format:</b>	This individual task requires you to write a report by following the steps below: 1. Choose an engineering product from a given list and state the need for the product 2. Explain how the product evolved by referring to research, e.g. from literature, product websites 3. Evaluate the functions/subfunctions and the means used in the product 4. Propose what will be the next iteration of this product following the essential design steps. You may wish to sketch this object, but detailed engineering drawings are not necessary.
<b>Criteria:</b>	1. Interpretation of engineering design to explain how the product evolved 2. Application of <i>a whole system design cycle approach</i> to engineering problems to: <ul style="list-style-type: none"> <li>• evaluate the role engineering design played in the evolution of the product:</li> <li>• propose and justify the next iteration (conceptual design) of the product taking into account human needs and outcomes</li> </ul> 3. Communication of your evaluation in a written report to specialist audiences: <ul style="list-style-type: none"> <li>• adhere to report template and word limit</li> <li>• English expression</li> <li>• use of terminology</li> <li>• follow referencing conventions</li> </ul>
<b>Engineers Australia competencies assessed in this task</b>	
1.4 Discernment of knowledge development and research directions within the engineering discipline.	
1.5 Knowledge of contextual factors impacting the engineering discipline.	
3.2 Effective oral and written communication in professional and lay domains	

**Assessment Task 3: Case study design brief and oral presentation**

<b>Goal:</b>	You will work in a group to solve a human-centric engineering problem to improve life by applying the whole system design cycle approach. Further, you will develop the important and complex skills of collaboration and communication that are invaluable professional engineering competencies.
<b>Product:</b>	Report
<b>Format:</b>	<p>You are given a brief describing the lifestyle of real human community. Your group of 3-4 will analyse the brief and come to identify a need in this community. You will apply basic concepts of design to propose a solution to meet that need. You are encouraged to be creative in responding to this real-life challenge to improve human living conditions. Ensure your design would be sustainable in the community and that you behaved ethically as a group in developing your design.</p> <p>Your group will be given assistance during tutorials to help clarify any concerns about choosing and defining a design problem from the brief. You will be given feedback on the preliminary draft of your design and your justification so that you can revise it and develop into your final report.</p> <p><b>10% of your mark:</b> One member of your group presents the group’s conceptual design response to the brief and a completed collaboration log outlining where report elements and project benchmarks were planned, met and evidenced by your group members. The presentation is to be 10 minutes using no more than 5 PowerPoint slides.</p>

	<b>40% of your mark:</b> The final report is a revision of the preliminary report and an update to the collaboration log. It takes into account your tutor's feedback on the preliminary report and peer feedback from the oral presentation and shows further development of the design and justification.
Criteria:	<p>You will be assessed based on:</p> <ol style="list-style-type: none"> <li>1) Locational appropriate design (considering socio-cultural context, potential outcomes, sustainability, constraints and risks)</li> <li>2) Engineering principals</li> <li>3) Application of whole systems design cycle approach</li> <li>4) Communication for specialist audiences: <ul style="list-style-type: none"> <li>• adhere to word limit</li> <li>• English expression</li> <li>• use of terminology</li> <li>• follow referencing conventions</li> </ul> </li> <li>5) Adherence to professional and ethical behaviour during collaboration. This will have elements of peer and tutor assessment of effective group dynamics and participation.</li> </ol> <p>Group's marks are awarded but can be varied individually using peer's rating of participation that is to be submitted with final report.</p>
<b>Engineers Australia (EA) competencies assessed in this task</b>	
<p>2.1 Application of established engineering methods to complex engineering problem solving.                  2.3 Application of systematic engineering synthesis and design processes.                  3.1 Ethical conduct and professional accountability                  3.2 Effective oral and written communication in professional and lay domains                  3.3 Creative, innovative and pro-active demeanour.                  3.6 Effective team membership and team leadership.</p>	

## 7. Directed study hours

The directed study hours listed here are a portion of the workload for this course. A 12 unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

This course will be delivered via technology-enabled learning and teaching. All lectures will remain in this mode for Semester 2 2020. When government guidelines allow, students that elected on-campus study via the class selection process will be advised when on campus tutorials and practical sessions will resume.

Location:	Directed study hours for location:
Sippy Downs	2 hrs Lecture Weeks 1-5, 1hr Lecture Weeks 6 – 10 2 hrs Workshops Weeks 1-13, Computer clinics weeks 5 & 6
Moreton Bay	2 hrs Lecture Weeks 1-5, 1hr Lecture Weeks 6 – 10 2 hrs Workshops Weeks 1-13, Computer clinics weeks 5 & 6

## 8. What resources do I need to undertake this course?

Please note that course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site. Please log in as soon as possible.

### 8.1 Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below as they are required:

Author	Year	Title	Publisher
Haik, Y et al	2016	Engineering Design Process, 3 <sup>rd</sup> ed.	Cengage Learning

## 8.2 Specific requirements

Nil

## 9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low.

It is your responsibility as a student to review course material, search online, discuss with lecturers and peers, and understand the health and safety risks associated with your specific course of study. It is also your responsibility to familiarise yourself with the University's general health and safety principles by reviewing the [online Health Safety and Wellbeing training module for students](#), and following the instructions of the University staff.

## 10. What administrative information is relevant to this course?

### 10.1 Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

### 10.2 Assessment: Additional requirements

#### Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

- The final mark is in the percentage range 47% to 49.4%
- The course is graded using the Standard Grading scale
- You have not failed an assessment task in the course due to academic misconduct

### 10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

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Weekdays and weekends are included in the calculation of days late.

To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

#### 10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to [Student Hub](#).

Contact Student Central for further assistance: +61 7 5430 2890 or [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au)

#### 10.5 Wellbeing Services

Student Wellbeing Support Staff are available to assist on a wide range of personal, academic, social and psychological matters to foster positive mental health and wellbeing for your success. Student Wellbeing is comprised of professionally qualified staff in counselling, health and disability Services.

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, mental health issue, learning disorder, injury or illness, or you are a primary carer for someone with a disability, [AccessAbility Services](#) can provide assistance, advocacy and reasonable academic adjustments.

To book an appointment with either service go to [Student Hub](#), email [studentwellbeing@usc.edu.au](mailto:studentwellbeing@usc.edu.au) or [accessability@usc.edu.au](mailto:accessability@usc.edu.au) or call 07 5430 1226

#### 10.6 Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:

<http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

#### 10.7 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Moreton Bay** - Service Centre, Building A – Ground Floor, 1 Moreton Bay Parade, Petrie
- **USC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au)

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For new course approvals only

### Appendix 1 Course content

<b>Week # / Module #</b>	<b>What key concepts/content will I learn?</b>
1	Introduction to Design: the big picture
2	Essentials of communicating design with CAD drawings
3	Drafting and presenting Engineering drawings: Multi views, Isometric,
4	Formulating design problems
5	Working together in team: Group Dynamics
6	Identifying needs and gathering information for design
7	Functions and means representation
8	Product design and redesign
9	Ethics and Moral Framework
10	Oral Presentation of design
11	Group work
12	Group presentation
13	Group report